

Superfund Records Center
SITE: Hanscom Air Force
BREAK: 8.3
OTHER: 34417

**Five-Year Review Report #1
Hanscom Air Force Base Superfund Site
Middlesex County, Massachusetts**

**Prepared by:
Robert Lim
U.S. Environmental Protection Agency - Region 1
JFK Federal Building (HBT)
Boston, MA 02203**

September 1997



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1

JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

September 15, 1997

Mr. Tom Best
Environmental Engineer
Hanscom Air Force Base
66 SPTG/CEV
Hanscom AFB, MA 01731

Re: *Five-Year Review Report #1*, Hanscom Air Force Base

Dear Tom:

Enclosed is your copy of *Five-Year Review Report #1* for Hanscom Air Force Base Superfund site. This document primarily presents the EPA's five-year review of the landfill cap remedy at Operable Unit 2 - Site 4.

As you will read in the conclusions section, general landfill cap maintenance and continuance of periodic cap inspections are recommended. With respect to the time frame for implementing the maintenance recommendation, I shall contact you to discuss this matter.

Please call me at (617) 223-5521 should you have any questions.

Sincerely,

A handwritten signature in black ink, which appears to read "Robert Lim".

Robert Lim, Remedial Project Manager
Federal Facilities Superfund Section

Enclosure

cc. Eileen Curry/Dynamac
Robert Spelfogel/HAFB (Letter Only)
Marc Slechta/CH2M HILL
Robert Campbell/MADEP

Five-Year Review #1 for the Hanscom Air Force Base Superfund Site

1.0 Background

This document is a report on the first five-year review for Hanscom Air Force Base (HAFB) Superfund Site in Middlesex County, Massachusetts. The base is located in the central part of Middlesex County, approximately 14 miles northwest of downtown Boston (See Figure 1). The base comprises approximately 826 acres and occupies land in the towns of Bedford, Concord, Lexington, and Lincoln.

Prior to 1973, the primary mission of Hanscom AFB was the operational maintenance of fighter aircraft and research and development support. The current mission is Research and Development and Command, Control, Communications, and Intelligence.

Hanscom AFB was listed on the National Priorities List in May 1994. The Air Force's Installation and Restoration program at the base began in 1984 with a record search. Since 1984, the Air Force has conducted investigations, removal and remedial actions, and monitoring at various sites.

Twenty-two sites were identified in the Air Force's Installation Restoration Program Management Action Plan (Air Force, 1994) (See Figure 2). For federal oversight, three operable units have been identified by the project team. The project team is composed of the respective project managers for the Air Force, EPA, and Massachusetts Department of Environmental Protection. Brief summaries of each operable unit is given below. Figures are provided at the end of the report. For more detailed information, please refer to the site file. Other sites not discussed are either being regulated under the state Superfund requirements or determined to require no further action.

1.0.1 Operable Unit 1 (Sites 1, 2, 3, and 5)

At OU-1, Sites 1, 2, 3, and 5, a groundwater pump and treat remedy has been operating since May 1991. Site 1 was reportedly used from the late 1960s through 1973 for fire training exercises. Waste oils, solvents, paint thinners, and degreasers were collected from around the base, dumped into a pit, ignited, and then extinguished. Site 2 was used for disposing of waste solvents and paint from 1966 to 1972. Sites 3 and 5 are adjacent to one another in the western and central sections of the airfield. Several hundred drums of waste oils and paint wastes were buried in the jet fuel residue area of Site 3 between 1959 and 1969. Disposal at the tank sludge area of Site 3, the northwest of the jet fuel residue area, reportedly occurred during the early 1960s. Fire training exercises at Site 5, northeast of Site 3, reportedly were conducted from the early 1950s through the 1960s. Contaminated soil and drum removals from Site 1, 2, and 3 were conducted in 1988. The pump & treat system is composed of: four extraction wells screened in

the lower and bedrock aquifers and located in a transect downgradient of the suspected source areas; two additional extraction wells within the plume; and surface aquifer collection trenches at Site 1, 2, and 3 (See Figure 3). Long-term monitoring which includes: groundwater and surface water sampling; quarterly effluent toxicity testing; and monthly treatment plant sampling, is being conducted. Sampling results for Round 10 were issued in July 1997 (Haley & Aldrich, 1997). A groundwater model is being developed for use in fate and transport modeling for risk assessment, and for a streamlined feasibility study (CH2M HILL, 1997a).

1.0.2 Operable Unit 2 (Site 4)

Specifically, the five-year review conducted for the Site 4, Old Sanitary Landfill (LF-04) site on Hanscom Air Force Base Superfund Site in Lincoln, Massachusetts (see Figure 4). Site 4 is located north and west of what is currently Hanscom AFB. The area is currently operated by the Massachusetts Port Authority (MASSPORT). This property together with the runway to the north was leased by the Air Force from 1952 to 1974. Site 4 is approximately 1,800 feet southwest of the approach to Runway 5-23 and 1,500 feet northwest on the intersection of Virginia Road and Old Bedford Road.

A Phase I Record Search revealed that the landfill was operated from 1964 to 1975 (JRB Assoc., Inc., 1984). In addition to typical municipal landfill wastes, it is suspected that containers of fuels, medical wastes, inks, battery acid, paints, mercury, photographic chemicals, trichloroethylene, and other solvents were routinely discarded at the landfill.

Site 4 was created by filling in a swampy area. The fill material was placed ten to 15 feet deep into the swamp. The surface was eight acres with steep slopes, up to 40%, existing at the edge of the fill. The landfill was constructed into the wetlands area associated with Elm Brook. The brook currently borders the landfill to the west side. Elm Brook flows north. Both leachate and erosion have been reported along the toe of the landfill, and exposed refuse was observed along the south edge of the landfill. The landfill was physically closed in 1975. Closure plans included placement of up to a low permeability soil cover.

1.0.3 Operable Unit 3 (Site 6 and 21)

OU-3 is composed of two sites, Site 6 and 21 (See Figure 5 & 6). Both sites are located in the northeastern corner of the base property near one end of Runway 5-23.

Site 6, the Former Filter Bed area is composed of three areas. They are: former filter beds (5.4 acres); west landfill (2.2 acres); and south landfill (5.4 acres). The former filter bed area was used as a sanitary landfill for an approximate ten year period. It is bounded on the west by the fuel storage facility fence line, on the east by the Base property line, a railroad spur on the north, and the site service road to the south. The west landfill is immediately adjacent to the Base's Roads and Grounds road salt/sand storage area. The site was previously investigated in 1984 and 1991. A subsequent remedial investigation was conducted in Fall 1996 by EA Engineering. A remedial

investigation report including a risk assessment are being prepared for submission in Fall 1997. Both the south and west landfill are composed primarily of construction debris and rubble.

Site 21 is a former fuel storage and distribution area. Underground storage tanks, above ground storage tanks, and two 500,000 gallon above storage tanks have been removed. Based on previous investigation data and past site uses, the LNAPL has been identified as jet fuel and DF-2 diesel fuel oil. In September 1995, a soil vapor extraction and passive groundwater collection system began operation to remove LNAPL and VOCs from the two areas in the subsurface. As of September 1997, approximately 2,500 gallons of product has been removed. A remedial investigation is being conducted in September 1997 and augmentation of the remedial system is also planned (ECS, 1997).

This report was prepared by the U.S. Environmental Protection Agency (EPA) Region 1 since no Federal Facilities Agreement exists between the EPA and the Air Force. The Air Force is the lead agency for the Hanscom Air Force Base. Both the EPA and the Massachusetts Department of Environmental Protection-Northeast Regional Office provide technical and regulatory oversight of the investigation and cleanup at the base.

1.1 Introduction

This five-year review was undertaken to review remedial actions and long-term monitoring data collected to date at OU-2, Site 4, to ensure that the landfill cap remain protective of human health and the environment. This review is required by federal statute for any site remedy which results in hazardous substances remaining on-site (CERCLA §121(c) and 40 CFR §300.430(f)(4)(ii)). Since no final decision has been made at either OU-1 or OU-3, no five-year reviews were conducted.

1.1.1 Purpose of the Report

The purpose of the five-year review is to confirm that the remedy at Site 4 remains effective at protecting human health and the environment. This report presents the results of a "Level III" five-year review, as determined by the EPA Region 1 and in accordance with OSWER Directive 9355.7-02 "Structure and Components of Five-Year Reviews." This review includes a summary of the human health and ecological risk assessment conducted by the Air Force's contractor, CH2M HILL, and a site inspection.

1.2 Remedial Objectives

The preferred remedial action plan included placement of a low permeable cap ($<10^{-7}$ cm/s), limited grading of the sides and top slopes, additional drainage ditch stabilization, removal of exposed refuse, placement of infiltration controls, and long-term monitoring of leachate, and groundwater and surface waters (Haley & Aldrich, 1988). Construction of the landfill cap

including the addition of a compensatory wetland occurred between April and October 1988. Along the east and north sides of the landfill, ditches were constructed to carry runoff from the adjacent areas around the landfill. The ditches carry runoff of the wetlands area and Elm Brook (See Figure 7).

1.3 Standards Review

Since there are no specific cleanup levels for containment, no standards review was conducted. As for other requirements, the landfill cap meets the Massachusetts state standards of a single-barrier cap for landfills.

1.4 Risk Assessment Review

CH2M HILL, the Air Force's contractor, conducted a supplemental sampling program in August 1996 and a human health and ecological risk assessment in 1997 (CH2M HILL, 1997b&c). The following is a summary of their assessment.

1.4.1 Human Health Risk Assessment

Potential health risks associated with Site 4 for current and future (which was assumed to be the same as current) sites uses were estimated for the following exposure scenarios:

- exposure of recreational users (ballfield users) to chemicals in the surface soil on the side slopes of the landfill through incidental ingestion and dermal contact.
- exposure of recreational users to chemicals in the sediment through incidental ingestion and dermal contact.
- exposure of downgradient off-site residents to chemicals in groundwater through ingestion and dermal contact.

As presented in the following table from the risk assessment, there are no unacceptable risks associated with exposure to Site 4 media. Risks in surface water, sediment, and groundwater were all below current EPA criteria ($HI < 1$ and $10^{-6} < \text{cancer risks} < 10^{-4}$).

Summary of Noncarcinogenic Hazards and Carcinogenic Risks

Pathway	Residential			Recreational			
	Child HI	Adult HI	Lifetime Risk	Child HI	Child Risk	Adult HI	Adult Risk
Groundwater							
Lower Aquifer							
Ingestion	1.4E-02	5.8E-03	7.9E-07				
Inhalation ¹							
Dermal ²	1.1E-03		2.5E-08				
Total	1.5E-02	5.8E-03	8.2E-07				

Pathway	Residential			Recreational			
	Child HI	Adult HI	Lifetime Risk	Child HI	Child Risk	Adult HI	Adult Risk
Surface Soil Ingestion Dermal Total				1.0E-02 3.2E-04 1.1E-02	3.6E-07 0.0E+00 3.6E-07	6.0E-03 2.6E-04 6.2E-03	5.7E-07 0.0E+00 5.7E-07
Sediment Ingestion Dermal ³ Total				1.5E-02 1.5E-02	1.0E-06 1.0E-06	8.4E-03 8.4E-03	1.6E-06 1.6E-06
¹ Not evaluated because no VOCs were detected in lower aquifer groundwater. ² Dermal exposure only evaluated for child. ³ Not evaluated because no constituents with published dermal absorption values selected as CPCs.							

1.4.2 Ecological Risk Assessment

The baseline ecological risk assessment was an evaluation of the potential ecological risks from the capped landfill. Risk was evaluated in the ecological risk assessemtn using a phased approach, which consisted of:

- Problem Formulation
- Identification of Ecological CPCs
- Development of Ecological Benchmarks, and
- Risk Characterization

The analytical data collected by O'Brien & Gere in 1995 and CH2M HILL in 1996 were screened against conservative benchmarks to identify analytes that clearly pose risk, or clearly do not pose risk. The benchmarks, based upon toxicological data, were identified for each CPC in each media of concern.

The results of the screening process resulted in the elimination of most habitats, media, and CPCs from further evaluation. All of the three habitats exhibited sediment concentrations below the screening benchmarks except benzoic acid in the sediments. Analytes in wetland soils from the phragmites area also fell below the benchmarks with the exception of iron, and surface water screening exceedances existed in all three habitats.

Site-specific risk analyses indicated the following:

- Benzoic acid in sediment is not likely causing significant ecological effects in the northern swale where it was detected;
- Iron in the wetland soils is unlikely to pose a significant risk of ecological effects in the areas dominated by phragmites; and
- Iron and other CPCs detected in surface water most likely pose no significant risk of ecological effects.

Based on the assessment, there are no significant ecological risks associated with Site 4. Risks associated with sediments, soils, and surface water were all found to be not significant.

2.0 Present Site Conditions

A majority of the 7.6 acre landfill is covered by grass, with some smaller sections of brush and woodland-type vegetative cover. The landfill is bounded to the west and south by wetlands and Elm Brook and to the east and north by drainage ditches. A softball field is located on the southeastern section of the landfill. The side slopes of the landfill are covered by a dense growth of trees and brush, and the landfill rises approximately 15 above the wetlands to the west. The site slopes gently from the northwest to the southwest, with numerous shallow depressions present on the landfill surface.

2.1 Summary of Site Activities

On May 2, 1997, representatives from EPA, Gannett Fleming, and Hanscom AFB conducted a field inspection to evaluate the current condition of the landfill cap at Site 4. The findings are summarized in the following section. See Appendix for a copy of the report.

3.0 Conclusions

3.1 Recommendations

The objective of this five year review is to confirm that the Site 4 remedial actions completed adequately protect human health and the environment. As presented in the field trip report, the following maintenance activities are recommended:

- regrade and seed bare areas of landfill cap;
- remove trees, low brush, and debris from landfill cap and drainage swales, and restore to original condition;
- fill burrows on landfill cap; and
- monitor both landfill cap and drainage swale for areas of settlement.

Due to the nature of the cap construction at the side slopes of the landfill cap, it is recommended that maintenance procedures follow the original design intent of the capping system (i.e., leave as is). Inspection of the side slopes should, however, continue on an annual basis. Any future areas of instability should be noted and investigated if conditions could affect the integrity of the landfill capping system (Gannett Fleming, 1997).

3.2 Statement of Protectiveness

Based on the field inspection, and human health and ecological risk assessment, protectiveness of the landfill cap at Site 4 has been demonstrated.



3.3 Next Review

Since construction of the landfill cap at Site 4 was completed in 1988, this five-year review report should have occurred in 1993. Therefore, the next five-year review of Hanscom Air Force Base will be in 1998.

4.0 References

- CH2M HILL, 1996. *August 29, 1996 Operable Unit 2 Sampling Report. Hanscom AFB, MA; Boston, MA; August.*
- CH2M HILL, 1997a. *Draft Groundwater Flow Model Report, Operable Unit 1, Hanscom Air Force Base; Boston, MA; July.*
- CH2M HILL, 1997b. *Final Baseline Ecological Risk Assessment, Operable Unit 2, Site 4, Hanscom Air Force Base; Boston, MA; April.*
- CH2M HILL, 1997c. *Final Human Health Risk Assessment, Operable Unit 2, Site 4, Hanscom Air Force Base; Boston, MA; April.*
- Department of the Air Force, *Technical Document to Support No Further Action Planned, Hanscom AFB, MA.*
- Department of the Air Force, 1994. *Installation Restoration Program Management Action Plan, Fiscal Year 1995, Final; Bedford, MA; December.*
- Environmental Compliance Services, Inc., 1997. *Response to EPA Comments for Remedial Investigation Work Plan Site 21, Hanscom AFB, Bedford, MA; Agawam, MA; June.*
- ERM, 1992. *Installation Restoration Program, Stage 4 - Long Term Monitoring, Final Summary Report, Hanscom Field, MA; Boston, MA; November 12.*
- Gannett Fleming, 1997. *Field Trip Report; Braintree, MA; June 18.*
- Haley & Aldrich, 1988. *Installation Restoration Program, Phase IV-A, Hanscom AFB Area I, Remedial Action Plan Site 4; Cambridge, MA; May*
- Haley & Aldrich, 1997. *Architect-Engineer Field Investigation Report Sampling Round No. 10, May 1997, Long-term Sampling Program, Hanscom Air Force Base, Bedford, Massachusetts; Cambridge, MA; August.*
- JRB Associates, Inc., 1984. *Installation Restoration Program Phase I - Records Search; Hanscom AFB, MA, August.*
- Massachusetts Port Authority, 1992. *Hanscom Field Generic Environmental Impact Report; Boston, MA.*
- O'Brien and Gere, Associates, 1996. *Supplemental Sampling and Environmental Update, Site 4-Sanitary Landfill; Quincy, MA; February.*

U.S. Environmental Protection Agency (USEPA), 1994. *Supplemental Five-Year Review Guidance*; OSWER Directive 9355.7-02A; Washington, DC; July.

USEPA, 1991. *Structure and Components of Five-year Reviews*; OSWER Directive 9355.7-02; Washington, DC; May 23.

Figures

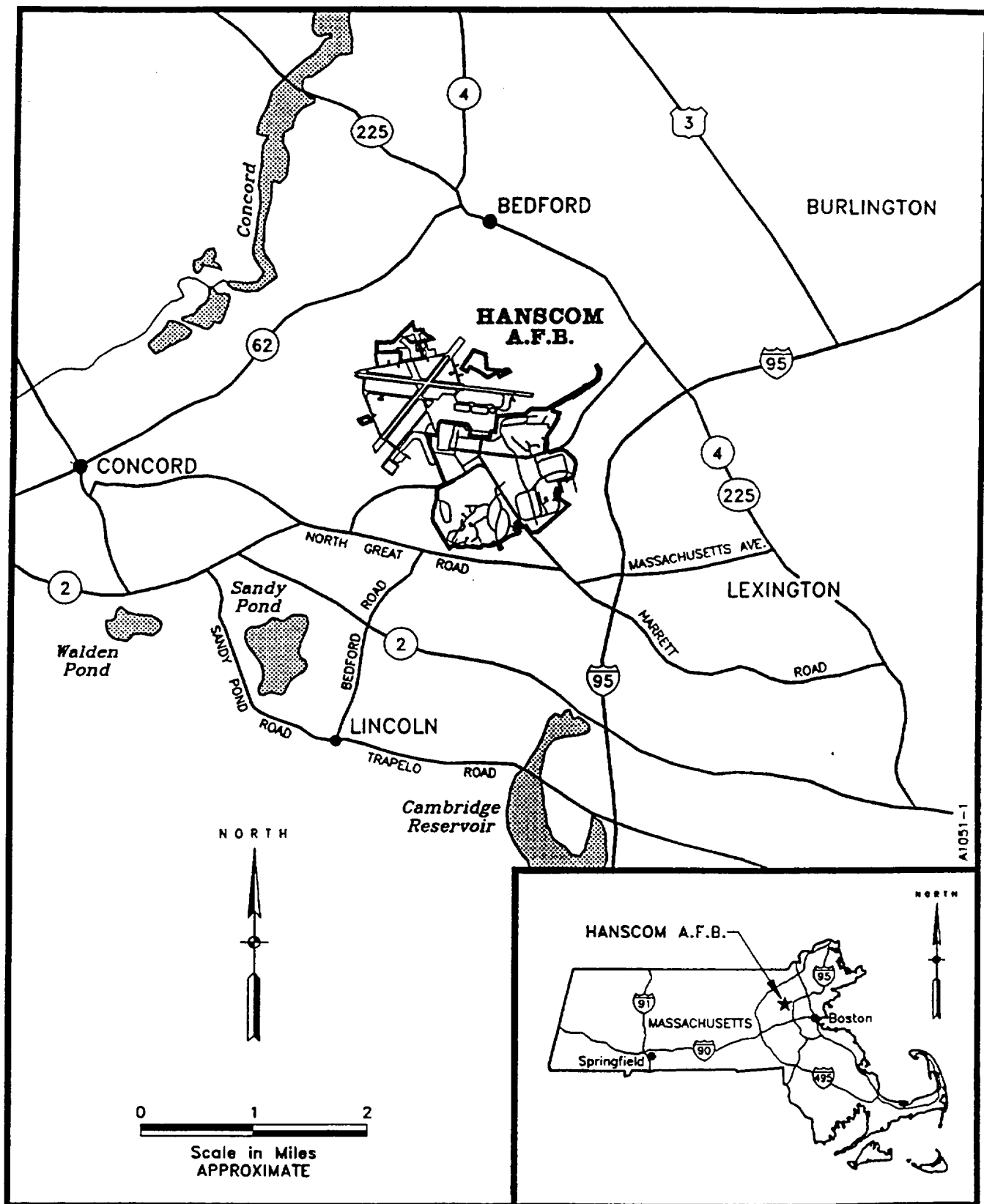


Figure 1. Location of Hanscom Air Force Base, Middlesex County, Massachusetts

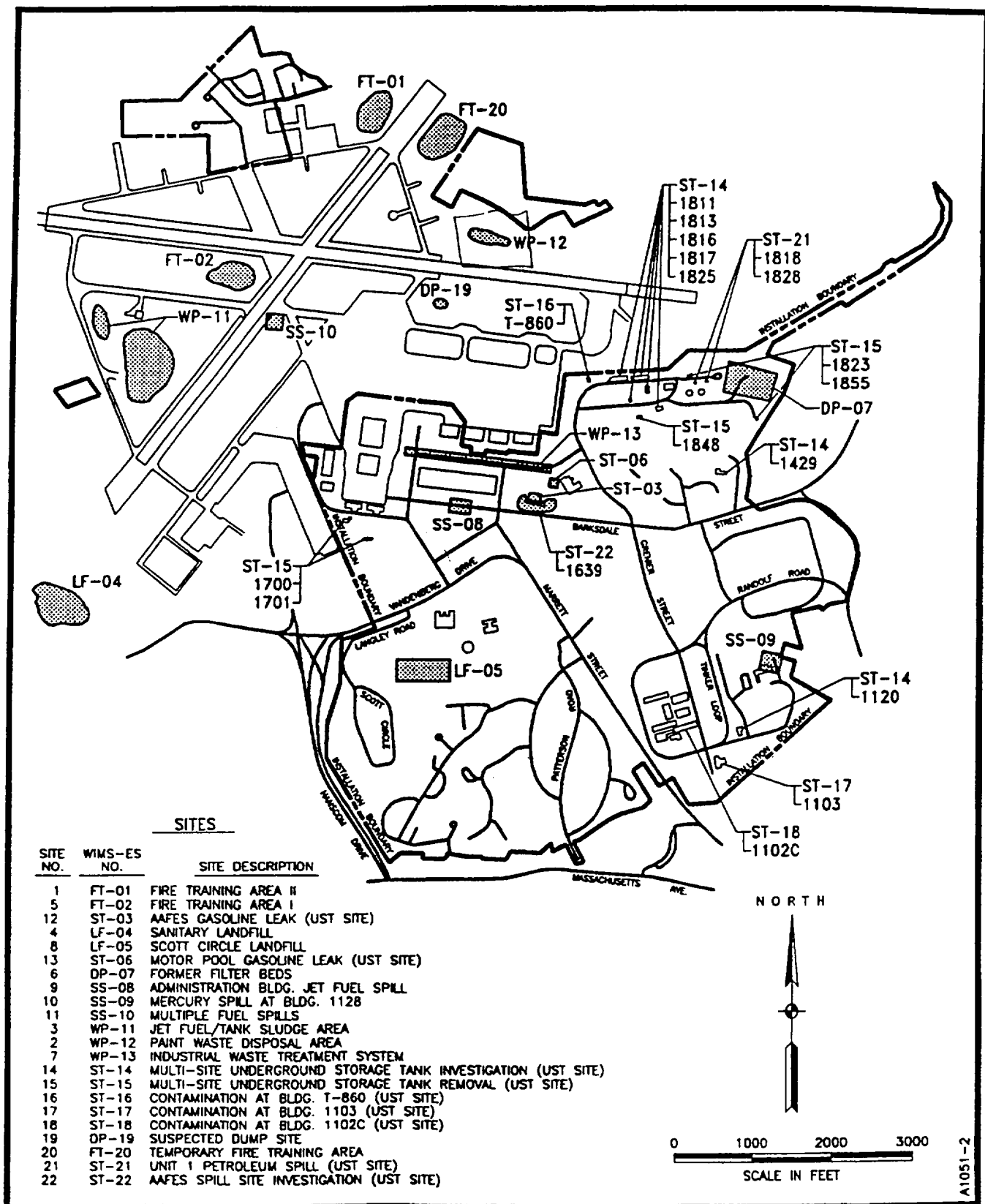
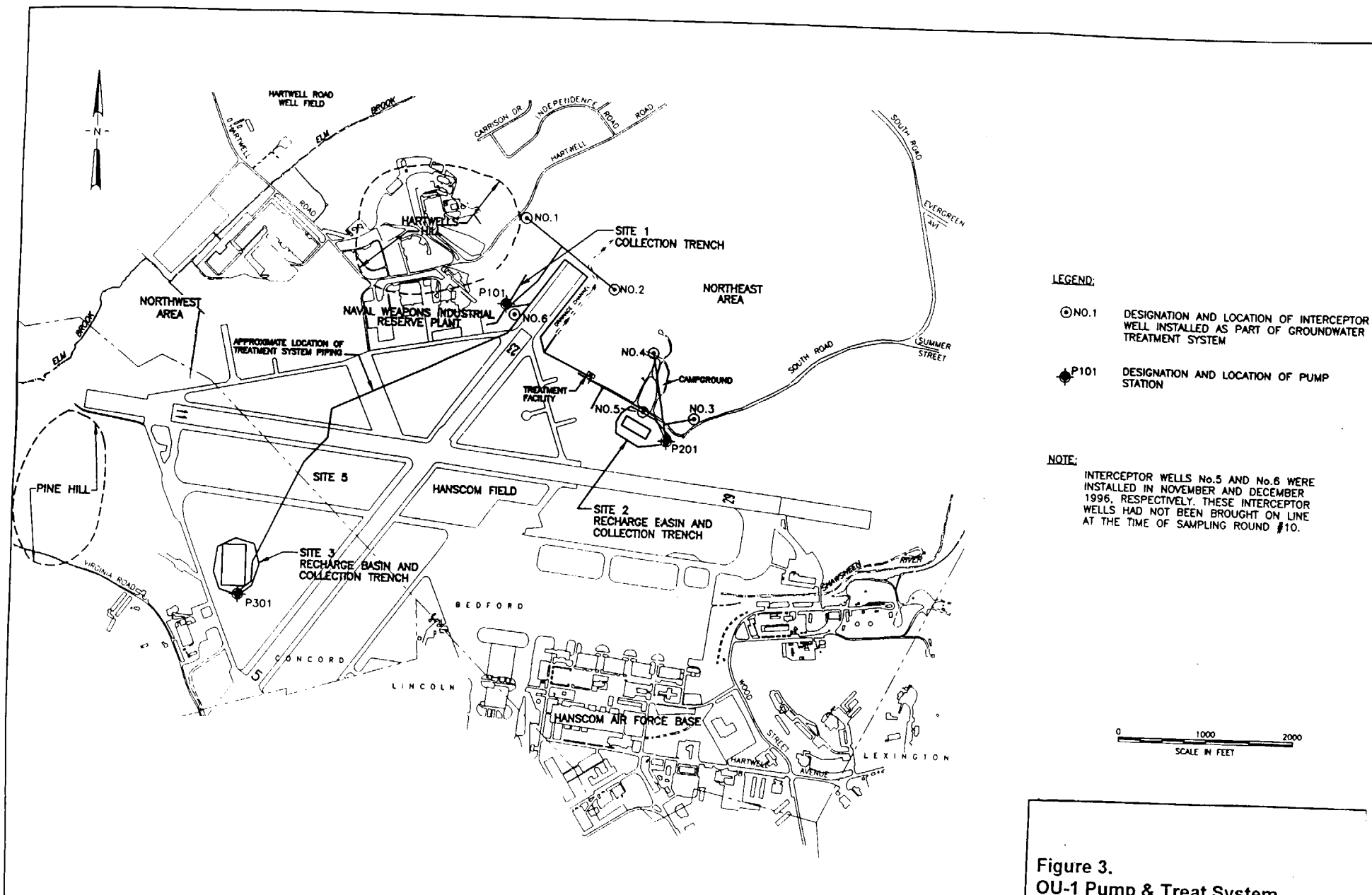
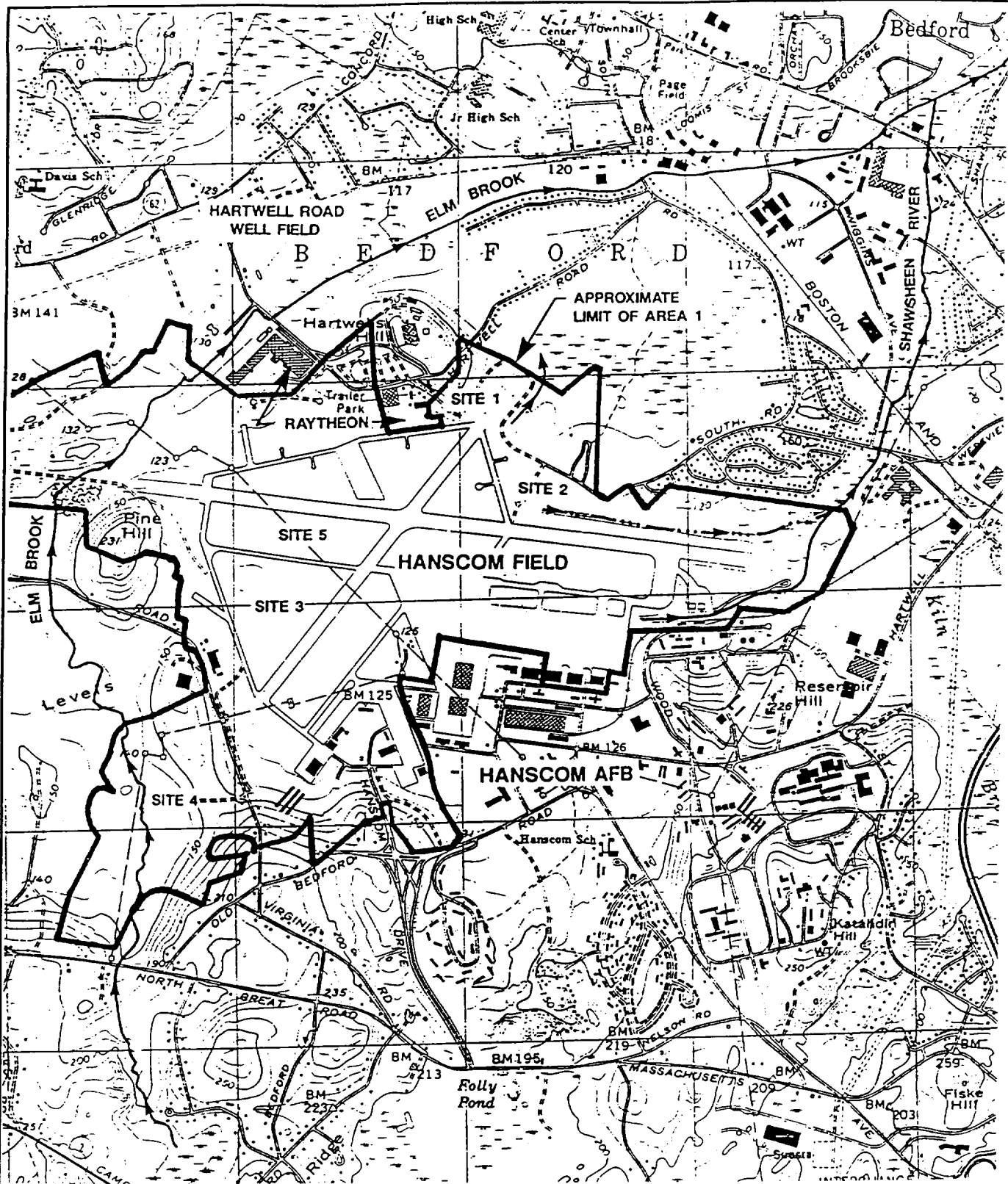
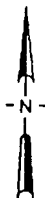


Figure 2. IRP Sites at Hanscom AFB, Middlesex County, Massachusetts





SITE COORDINATES: 42°28'08"N 71°17'33"W

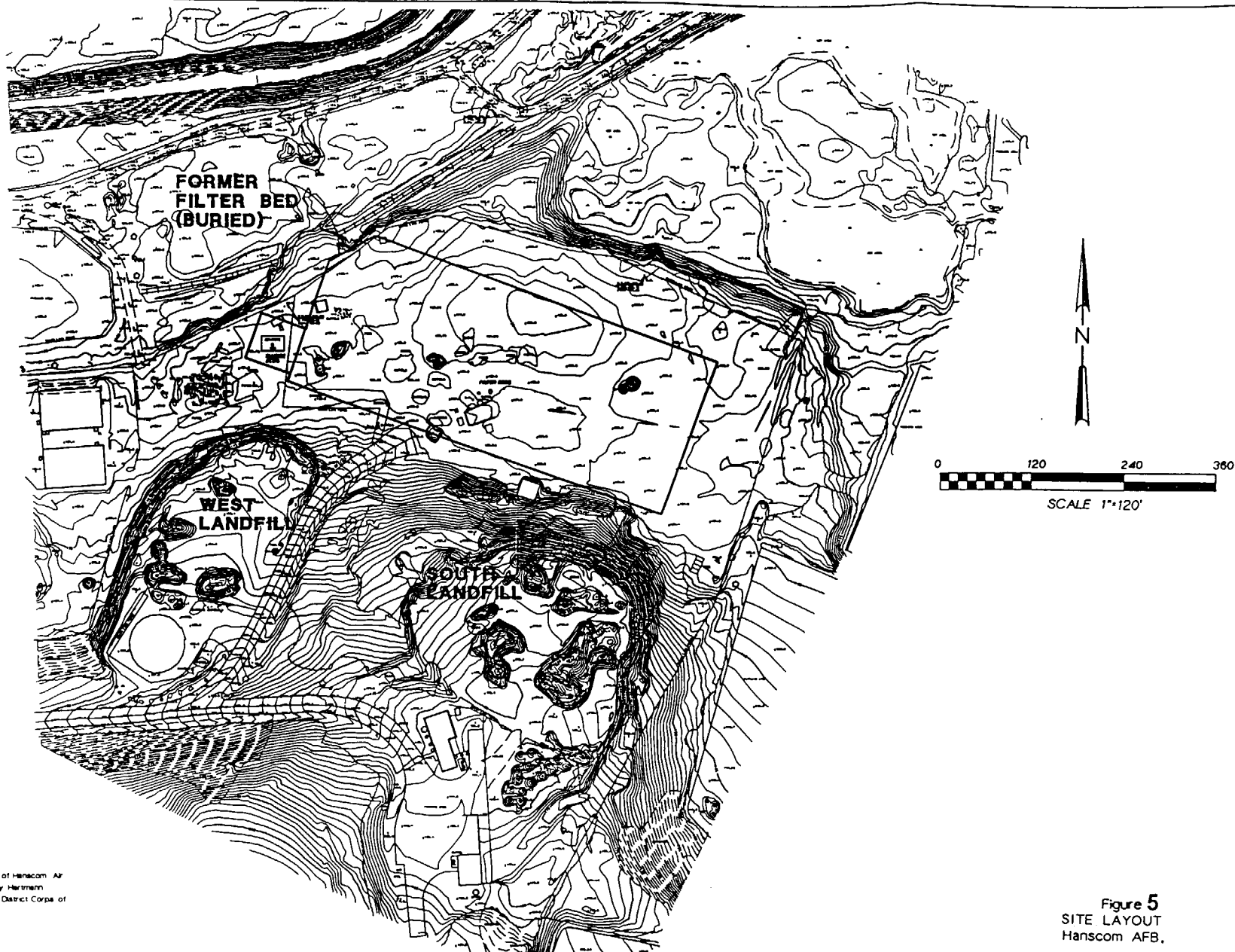


U.S.G.S. QUADRANGLE: CONCORD, MA

PROJECT LOCUS

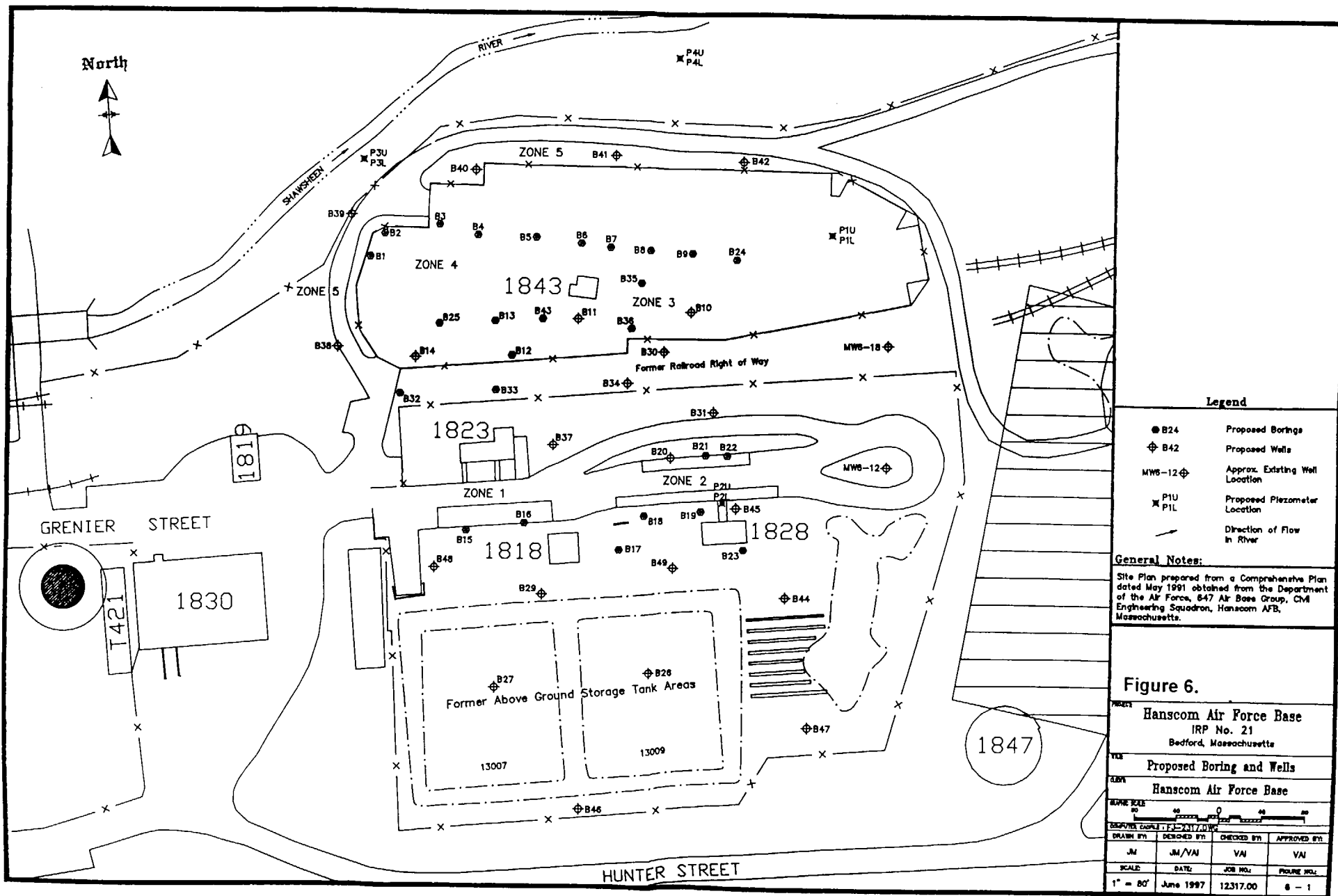
APPROXIMATE SCALE: 1:25,000

Figure 4
OU-2 Site 4



Topographic map from draft version of Hanscom Air Force Base Landfill No. 6 funded by Hermann Assoc., Inc. for U.S. Army Engineer District Corps of Engineers, Omaha, Nebraska.

Figure 5
SITE LAYOUT
Hanscom AFB,



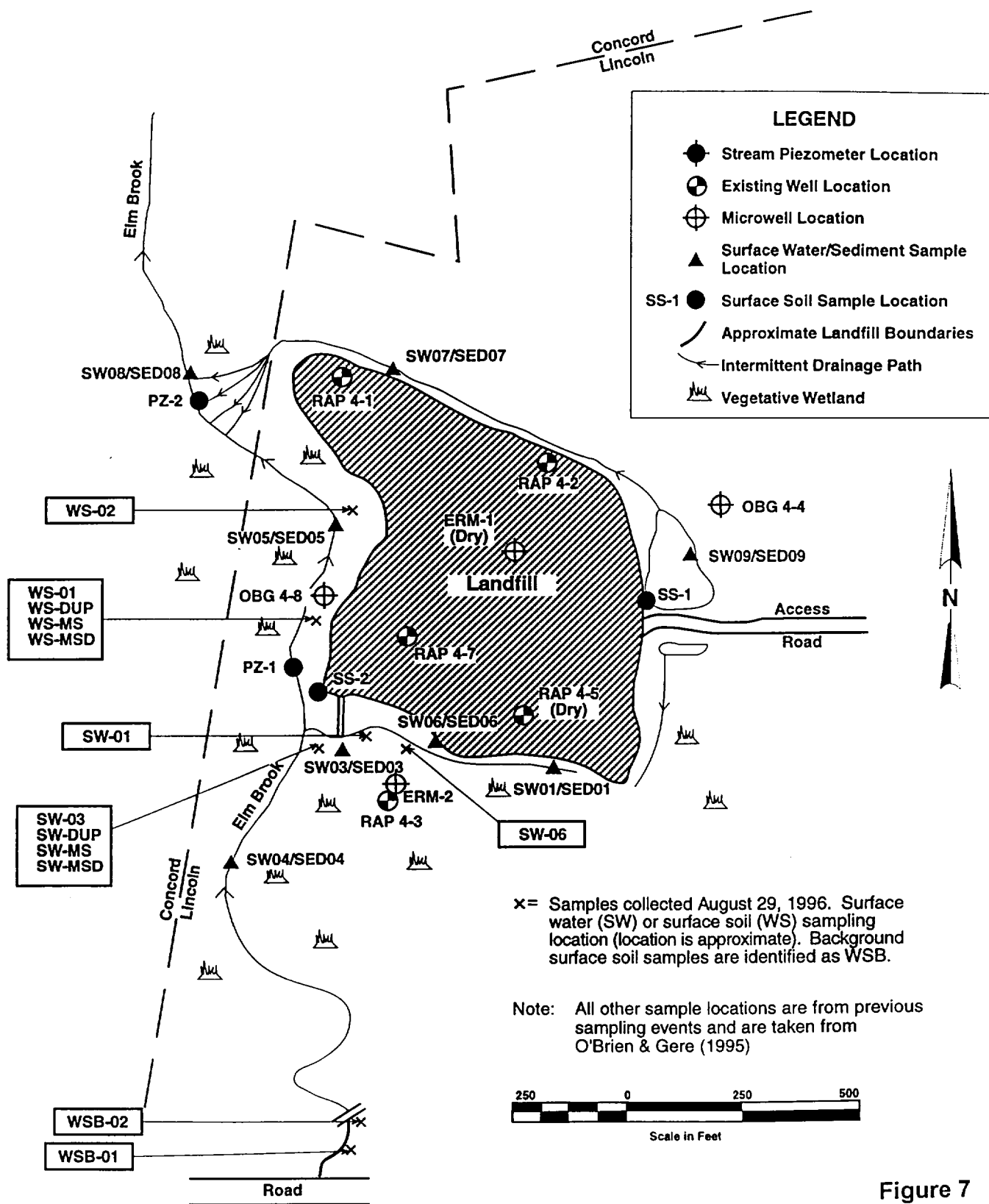


Figure 7
Site 4-Sanitary Landfill
Site Plan With Sampling Locations
 Hanscom AFB
 Bedford, MA

Appendix

FIELD TRIP REPORT HANSCOM AIR FORCE BASE

1.1 SUMMARY OF ACTIVITIES

On May 2, 1997, Gannett Fleming, Inc. (GF) performed a field inspection of the Site 4 Sanitary Landfill at the Hanscom Air Force Base. The field inspection was conducted to evaluate the current condition of the landfill cap. Attachment 1 contains copies of photographs taken during the field inspection.

1.2 SITE DESCRIPTION

From approximately 1964 to 1974, Site 4 was used as a landfill for the disposal of solid waste. Currently, the landfill is maintained by the Massachusetts Port Authority (MASSPORT). The southeastern portion of the landfill is used seasonally as a softball field.

The landfill is approximately 7.6 acres in size. In 1988 it was capped with a low permeability soil. Conversations with Hanscom personnel indicate that the capping system is comprised of clay placed only on the top of the landfill. Clay was not placed on the side slopes of the landfill in order to minimize disturbance of adjacent wetlands. Segments of the side slopes were simply regraded, while others were left as is. The capping system also involved construction of a perimeter drainage swale. Flow in the drainage swale is directed to asphalt-lined channels which discharge into the Elm Brook wetlands.

1.3 FIELD INSPECTION

As seen on the attached photographs, the top surface of the landfill is generally covered with vegetation. With the exception of the softball field and smaller isolated bare areas, the vegetation is well maintained. Neither cracks nor areas of settlement were observed during the inspection. Two trees, however, were observed growing along the northeastern edge of the cap. A small hole, presumably an animal burrow, was found along the western edge of the cap. Trees, burrows and bare areas all affect the integrity of the landfill by allowing surface waters to enter the capping system.

Inspection of the drainage swale revealed well maintained conditions with few exceptions. Photograph 5 shows a typical view of the drainage swale. Lined with a bed of 3/4-inch stone, the swale is approximately 8 to 10 feet wide with side slopes of about 2H:1V. There are 4 asphalt lined channels for discharge of waters collected in the drainage swale. These channels discharge into the wetlands of the Elm Brook. The drainage swale is generally free of debris and vegetative growth. In the western edge of the landfill cap, low brush was observed growing in two areas of the swale. Debris was seen in the drainage swale along the southern edge of the cap, near the softball field. If not removed and properly maintained, both could restrict the flow of water in the drainage swale.

Photographs 8 through 10 show typical conditions of the side slopes of the landfill. In general, the vegetation on these slopes is not maintained. Large trees, low brush and debris are commonly found throughout the side slopes of the landfill. Side slopes along the northwestern edge of the landfill are relatively flat. Along the southern edge of the landfill, side slopes are approximately 1V:1H.

All slopes appeared to be stable with no major areas of sloughs or slides. Areas of erosion, however, were seen during the inspection. Note that full inspection of all slopes was hindered due to the heavy vegetative growth.

1.4 MAINTENANCE RECOMMENDATIONS

To the best of their knowledge, Hanscom personnel indicated that maintenance of the landfill currently consists of mowing the cap annually. The following actions are, therefore, recommended:

- Regrade and seed bare areas of landfill cap.
- Remove trees, low brush and debris from landfill cap and drainage swale. Restore areas to original condition.
- Fill burrows on landfill cap.
- Monitor both landfill cap and drainage swale for areas of settlement.

With respect to the side slopes of the landfill, it is recommended that maintenance procedures follow the original design intent of the capping system, i.e. leave as is. Inspection of the side slopes should, however, continue on an annual basis. Any future areas of instability should be noted and investigated if conditions could affect the integrity of the landfill capping system.

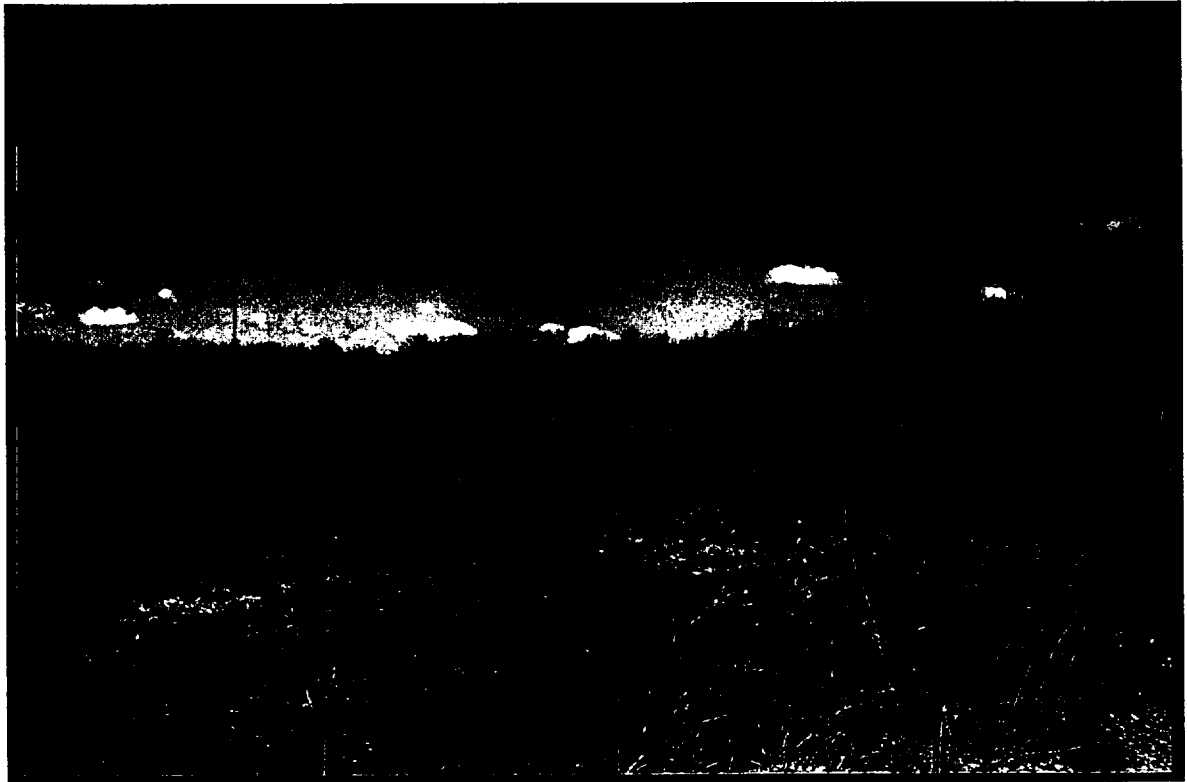
1.5 PERSONNEL ON SITE

Mandy Giampaolo
Gannett Fleming, Inc.
150 Wood Road
Braintree, MA 02184
(617) 380 - 7750

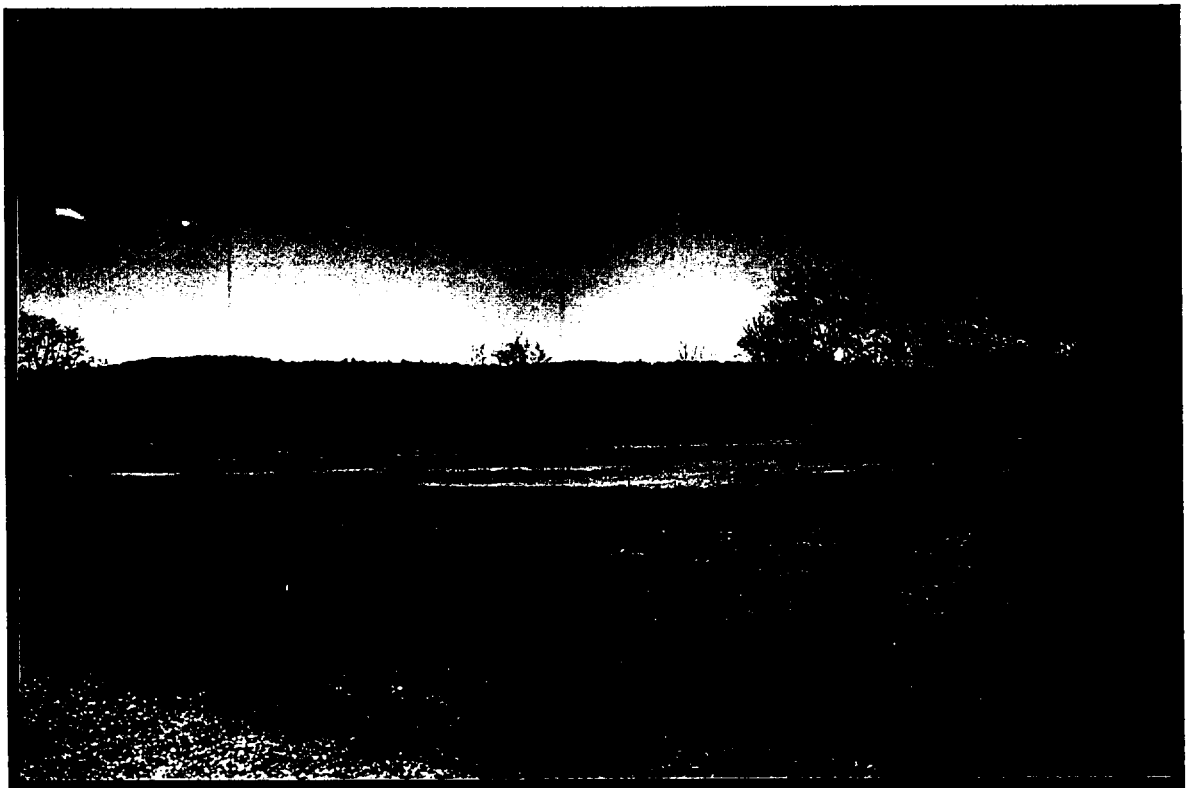
ATTACHMENT 1

Hanscom Air Force Base
Site 4 - Sanitary Landfill

Photographs



1. View from access road of northern portion of landfill.



2. View from access road of southern portion of landfill.

Hanscom Air Force Base
Site 4 - Sanitary Landfill
Photographs (cont.)

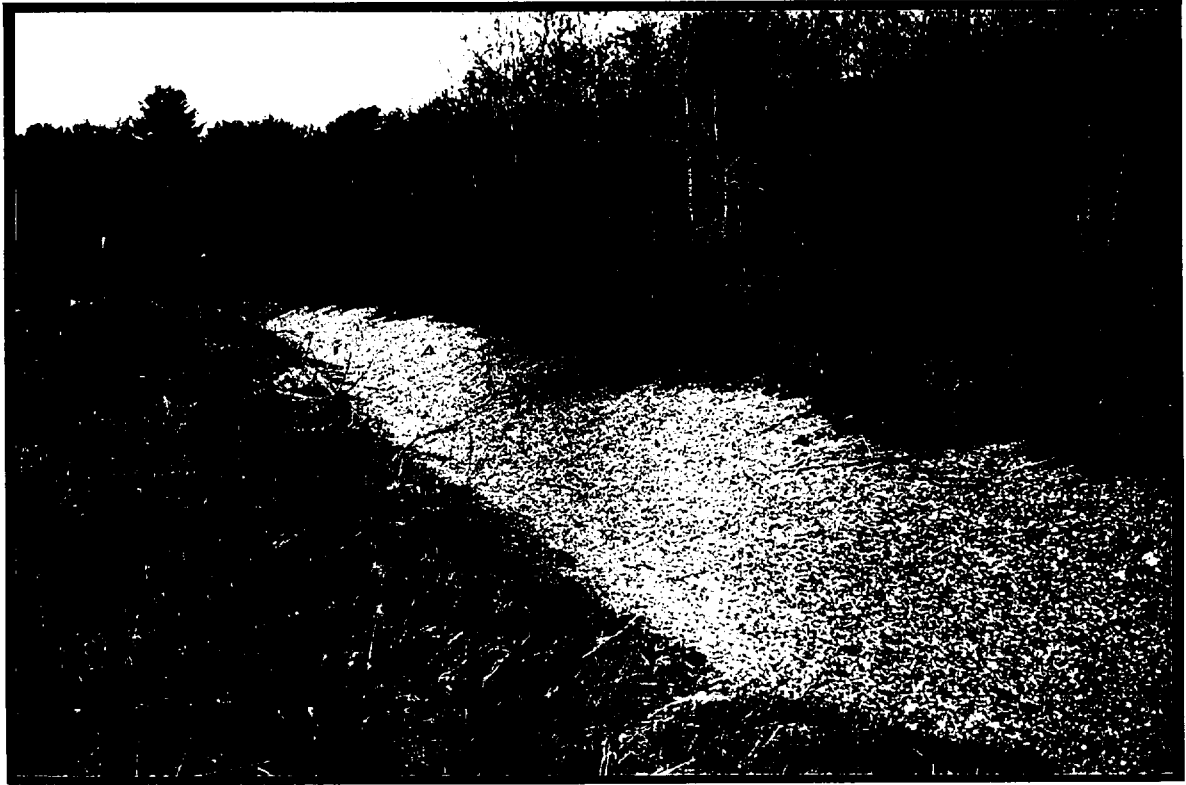


3. View of southwestern portion of landfill.

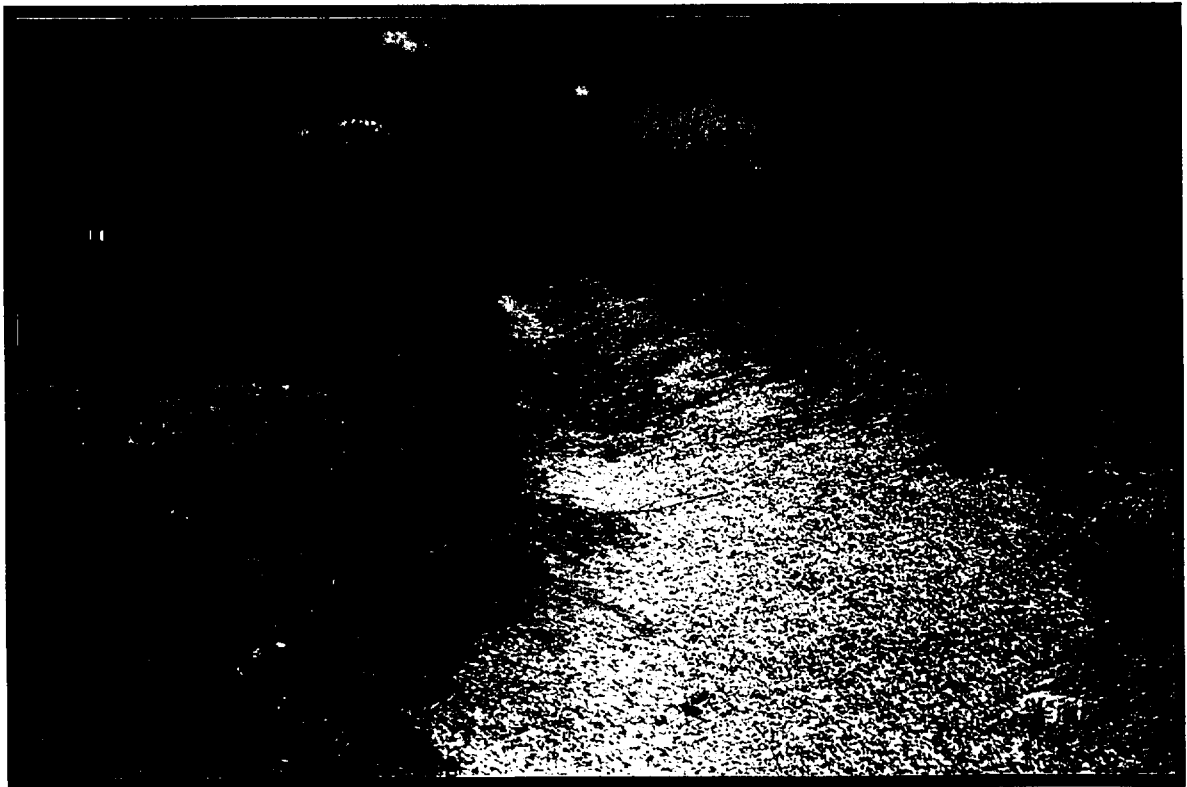


4. View of northernmost section of landfill.

Hanscom Air Force Base
Site 4 - Sanitary Landfill
Photographs (cont.)



5. Typical view of drainage swale. Photo of northern drainage swale.

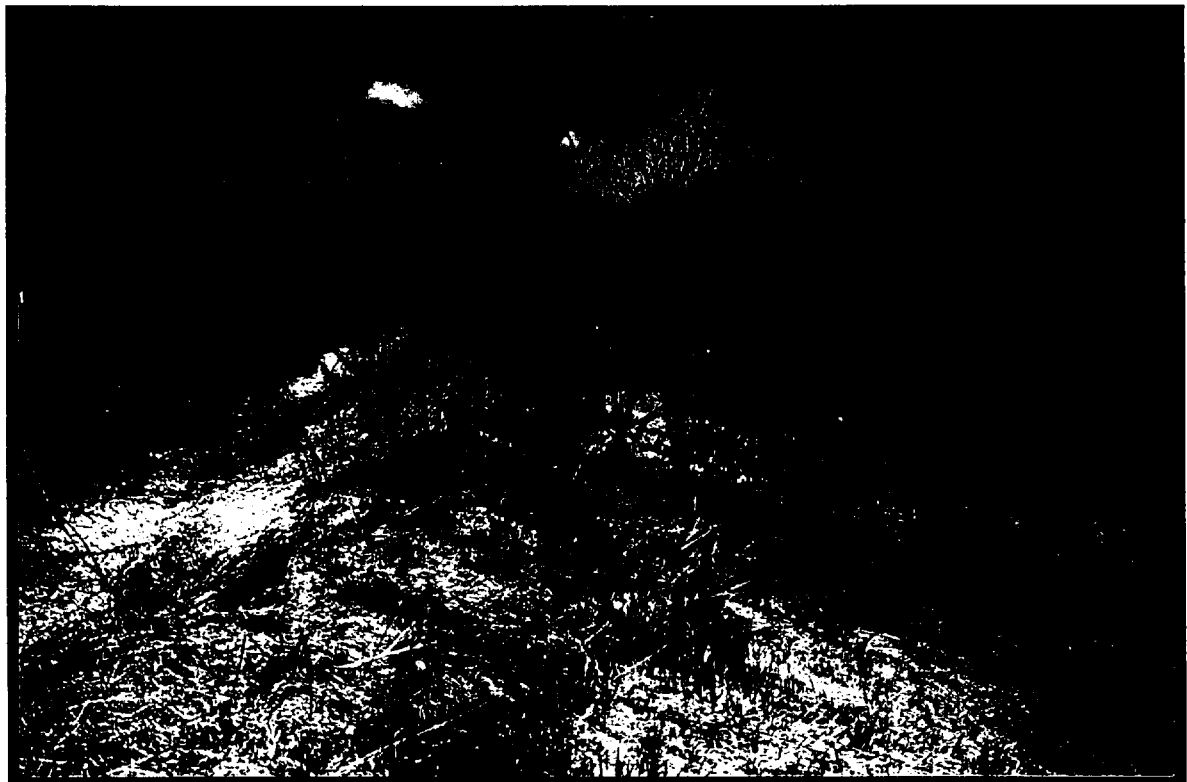


6. View of drainage swale along southeastern edge of landfill cap. Note growth of tree within landfill cap.

Hanscom Air Force Base
Site 4 - Sanitary Landfill
Photographs (cont.)



7. View of drainage swale along western edge of landfill cap. Note growth of brush within drainage swale.



8. Typical view of side slope showing growth of brush and trees. Photo of side slope along northeastern edge of landfill.

Hanscom Air Force Base
Site 4 - Sanitary Landfill
Photographs (cont.)



9. View of side slope along northern edge of landfill. Note heavy brush and tree growth.



10. View of southern side slope showing steepness of slope and heavy vegetative growth.